United States Patent [19]

Dyer

[11] **3,998,460**

[45] **Dec. 21, 1976**

[54] **VEHICLE RACING GAME APPARATUS**

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[73] Assignee: **Mattel, Inc.,** Hawthorne, Calif.

[22] Filed: **Feb. 3, 1976**

[21] Appl. No.: **655,023**

[52] **U.S. Cl.** ..... **273/86 D;** 46/206; 46/202; 273/86 H

[51] **Int. Cl.²** **A63F 9/14**

[58] **Field of Search** ..... 273/86 D, 86 H; 46/1 K, 46/202, 206; 104/60

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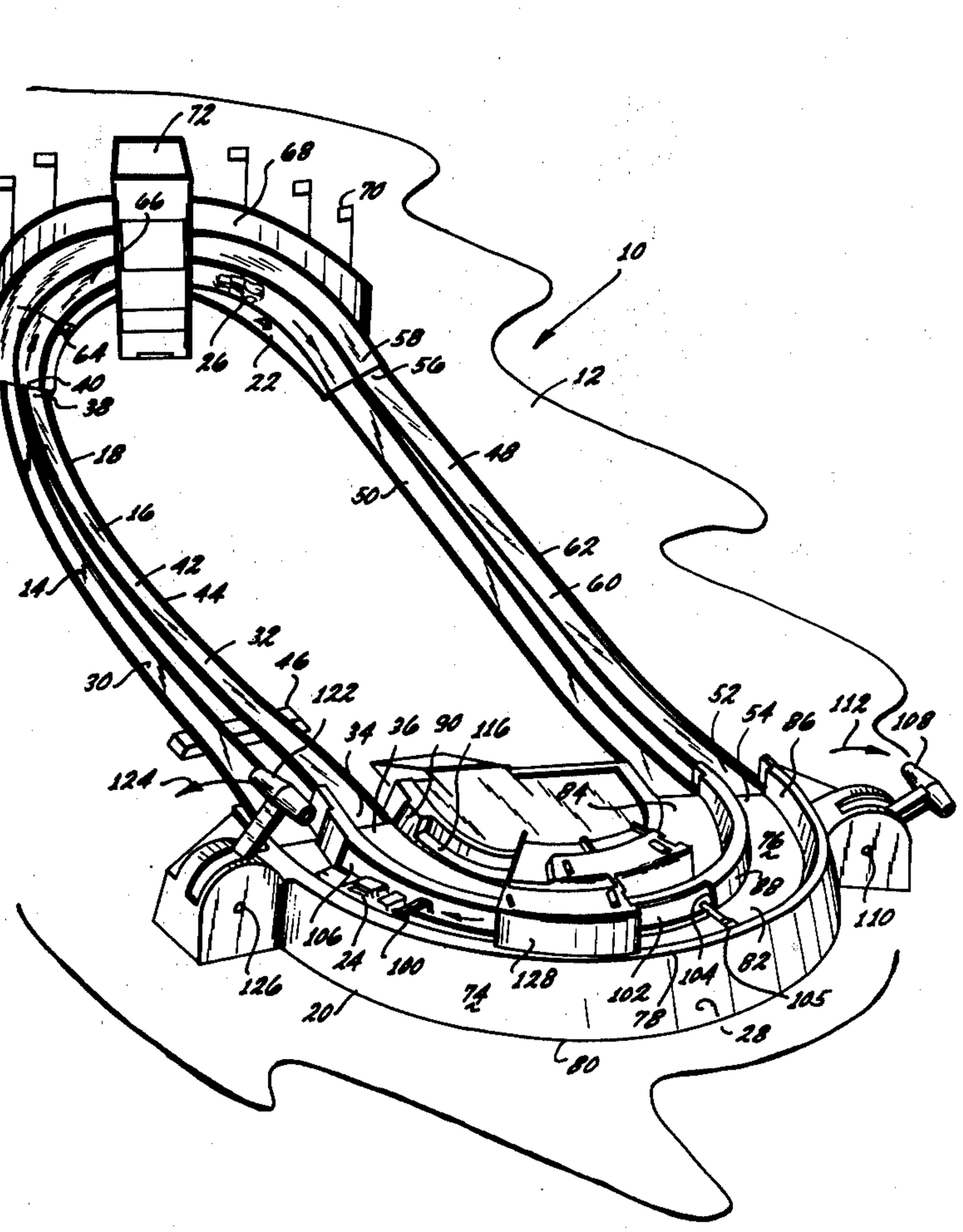
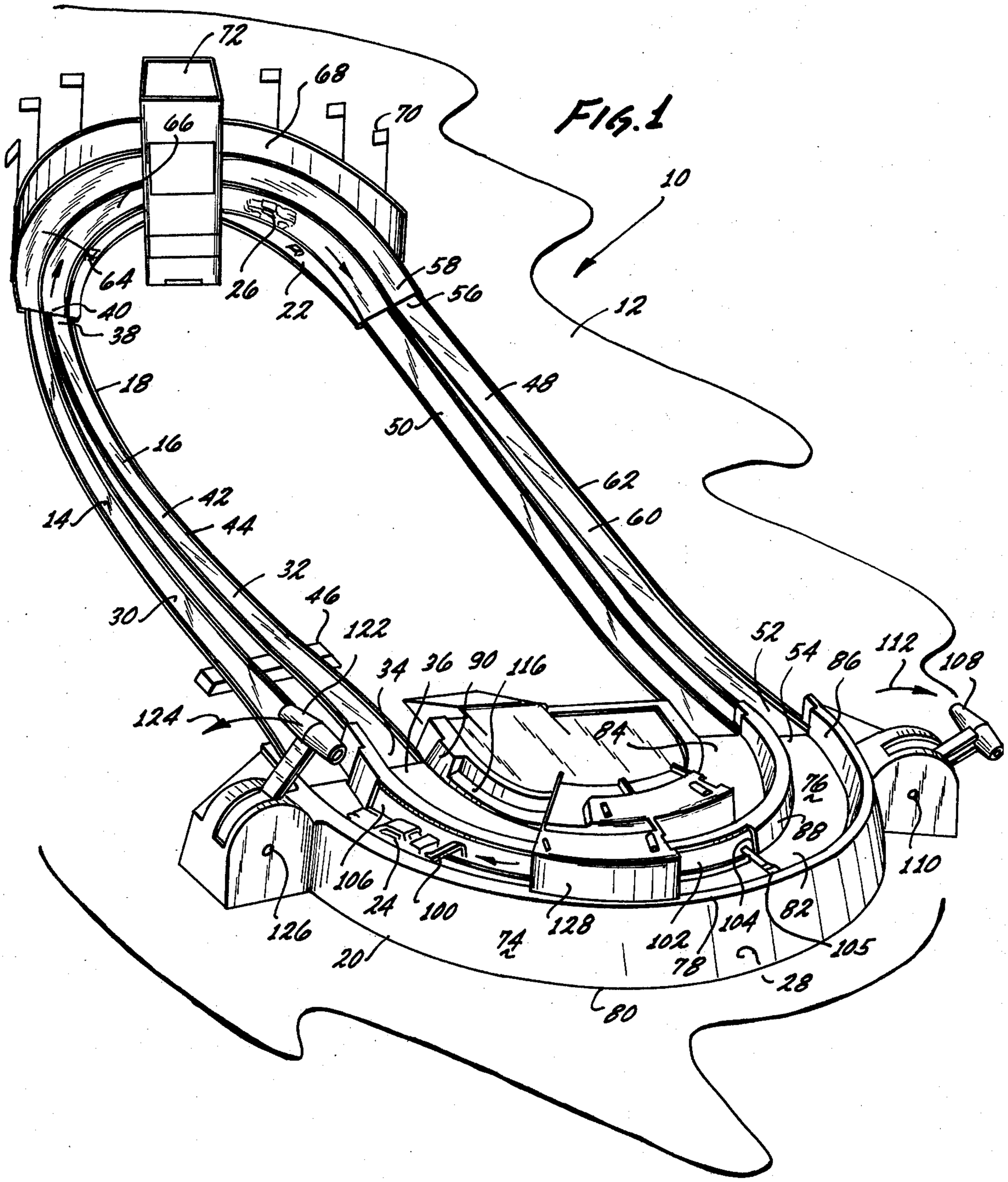
Primary Examiner—Anton O. Oechsle
Attorney, Agent, or Firm—John M. May; Stephen L. King; Max E. Shirk

[57] **ABSTRACT**

Two side-by-side tracks form a closed loop having a curve at each end; the tracks support vehicles each of which moves around the closed loop as a result of impulses supplied to it by an improved vehicle-propulsion device located entirely within one of the curves for manual actuation by a child-user, and characterized by a novel propulsion arm which tilts upwards into its operating position about a fulcrum in response to an actuating force transmitted by a flexible tape which also causes said arm to rotate horizontally about a shaft.

6 Claims, 9 Drawing Figures

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44
32
46
30
122
52
54
86
112
108
34
36
90
116
124
84
76
88
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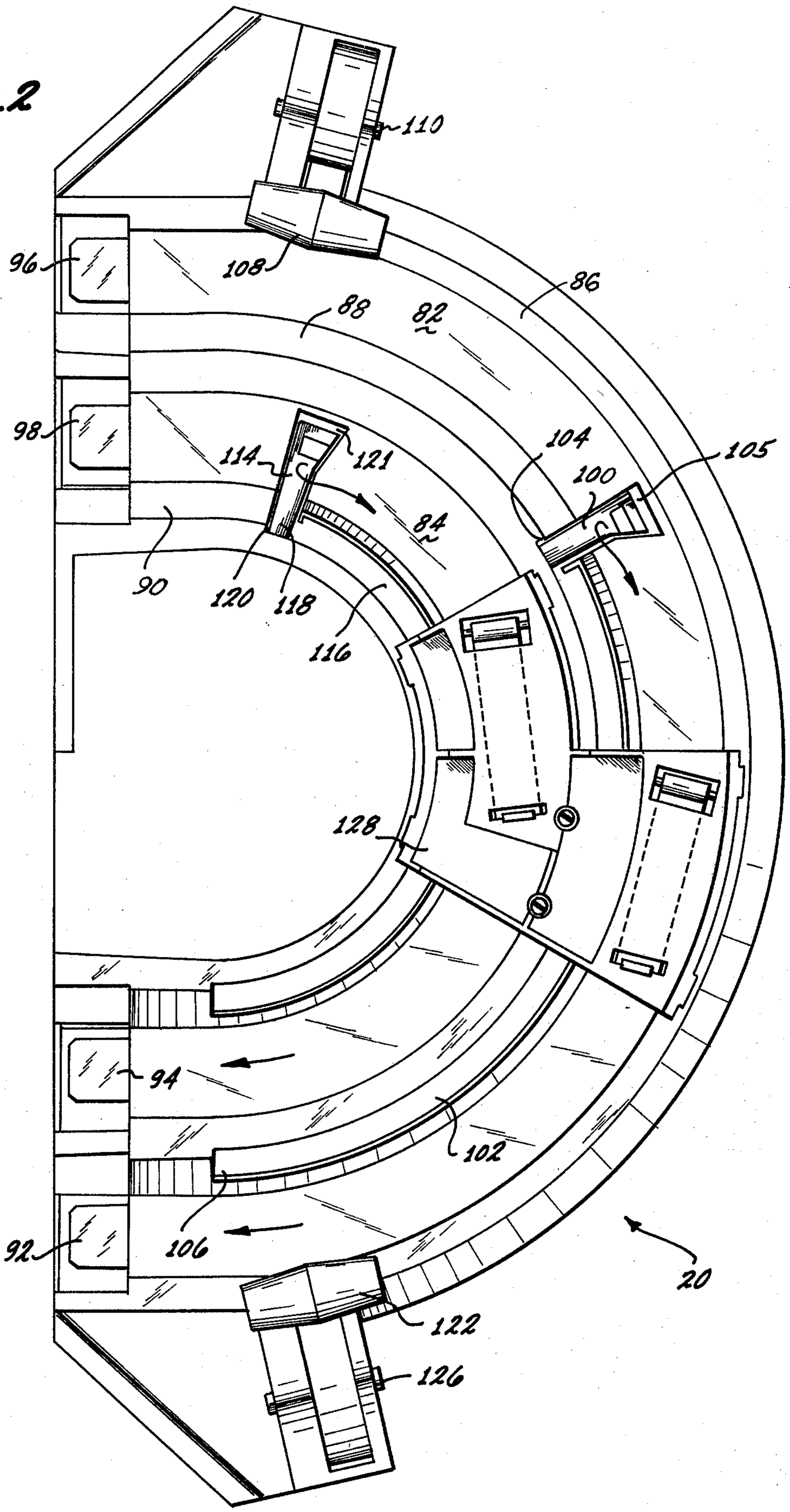
106
24
100
126
128
102
104
82
74
105
20
78
28
80

FIG. 1

FIG. 2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96
108
86
88
82
98
104
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114
121
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84
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116
128
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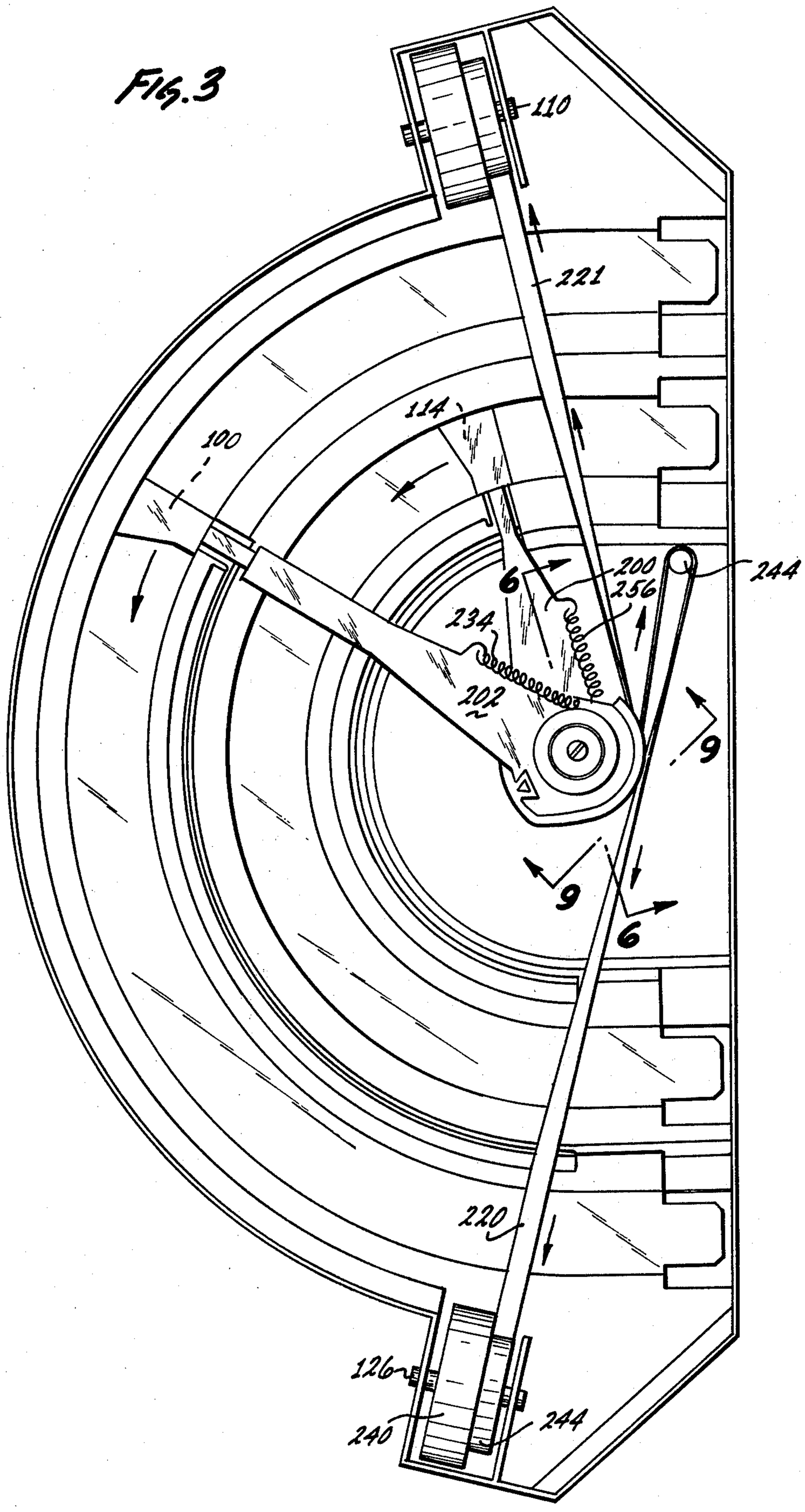
102
92
106
20
122
126

FIG. 3



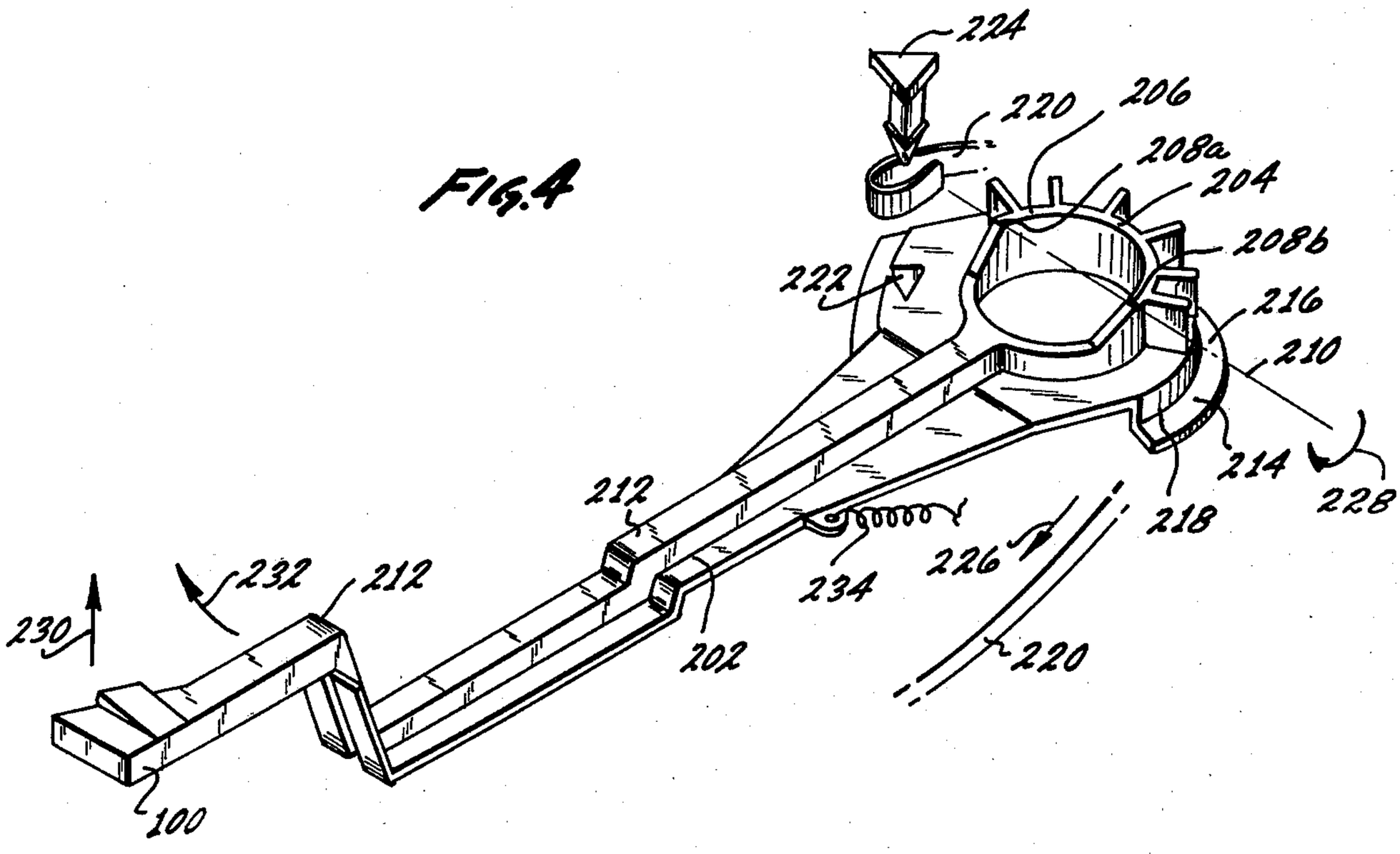

224
220
206
208a
204
208b
222
216
210
214
228
218
212
226
234
202
232
212
230
220
100

FIG. 4

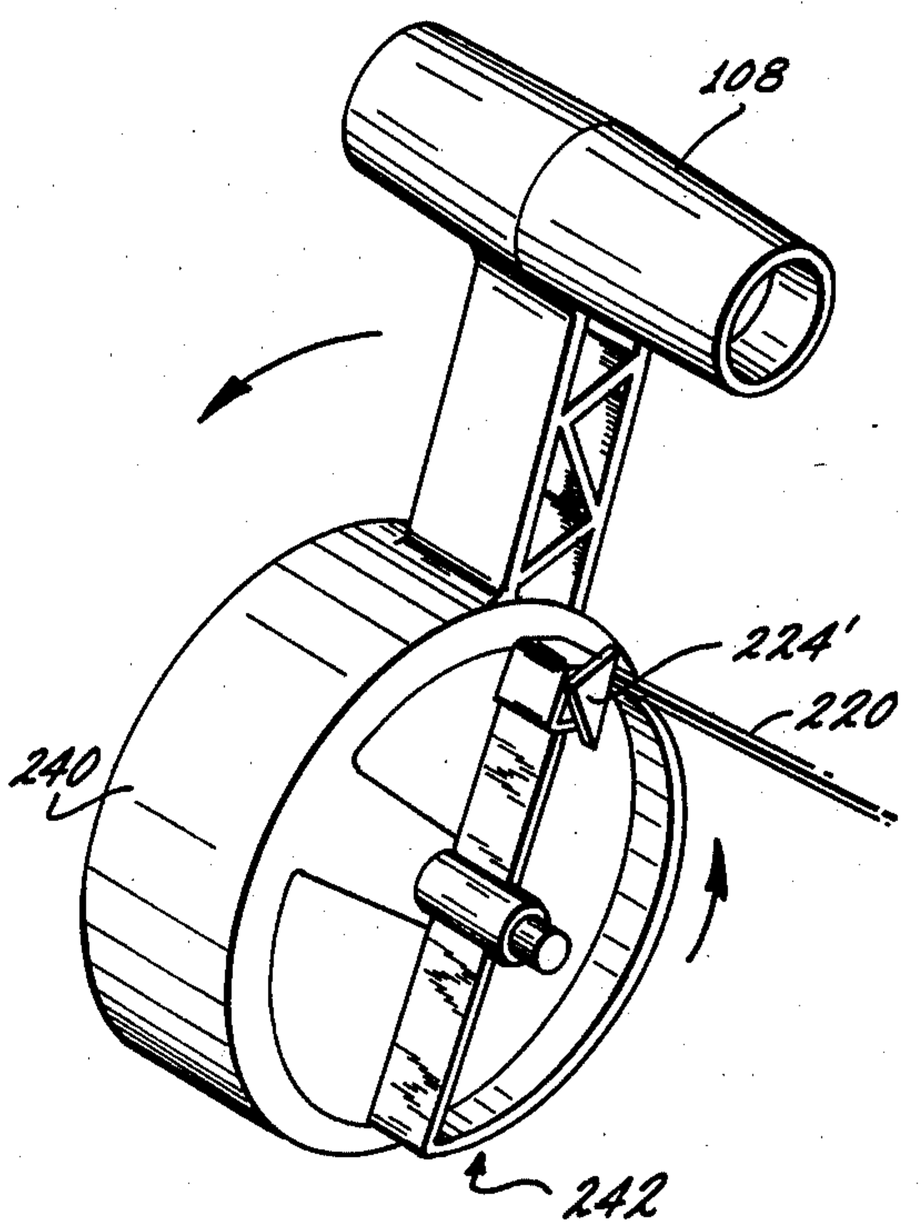

108
224'
220
240
242

FIG. 5

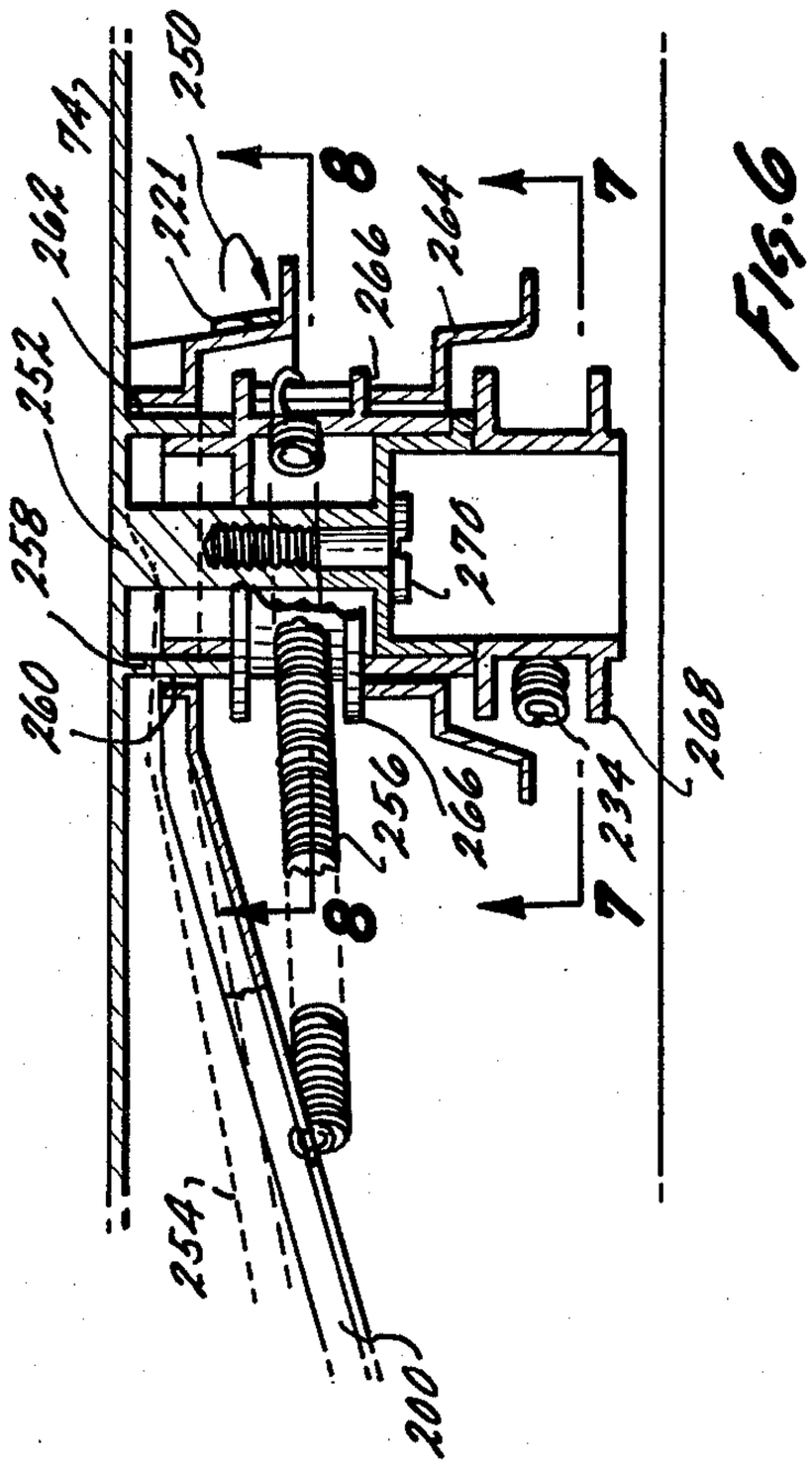


FIG. 6

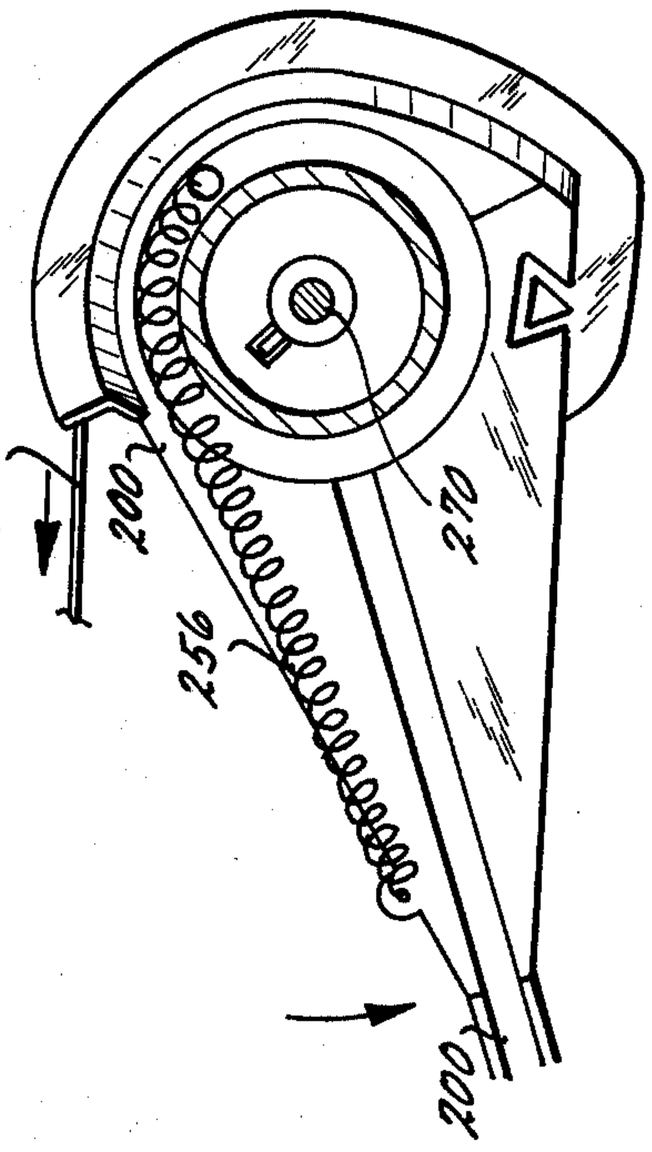


FIG. 8

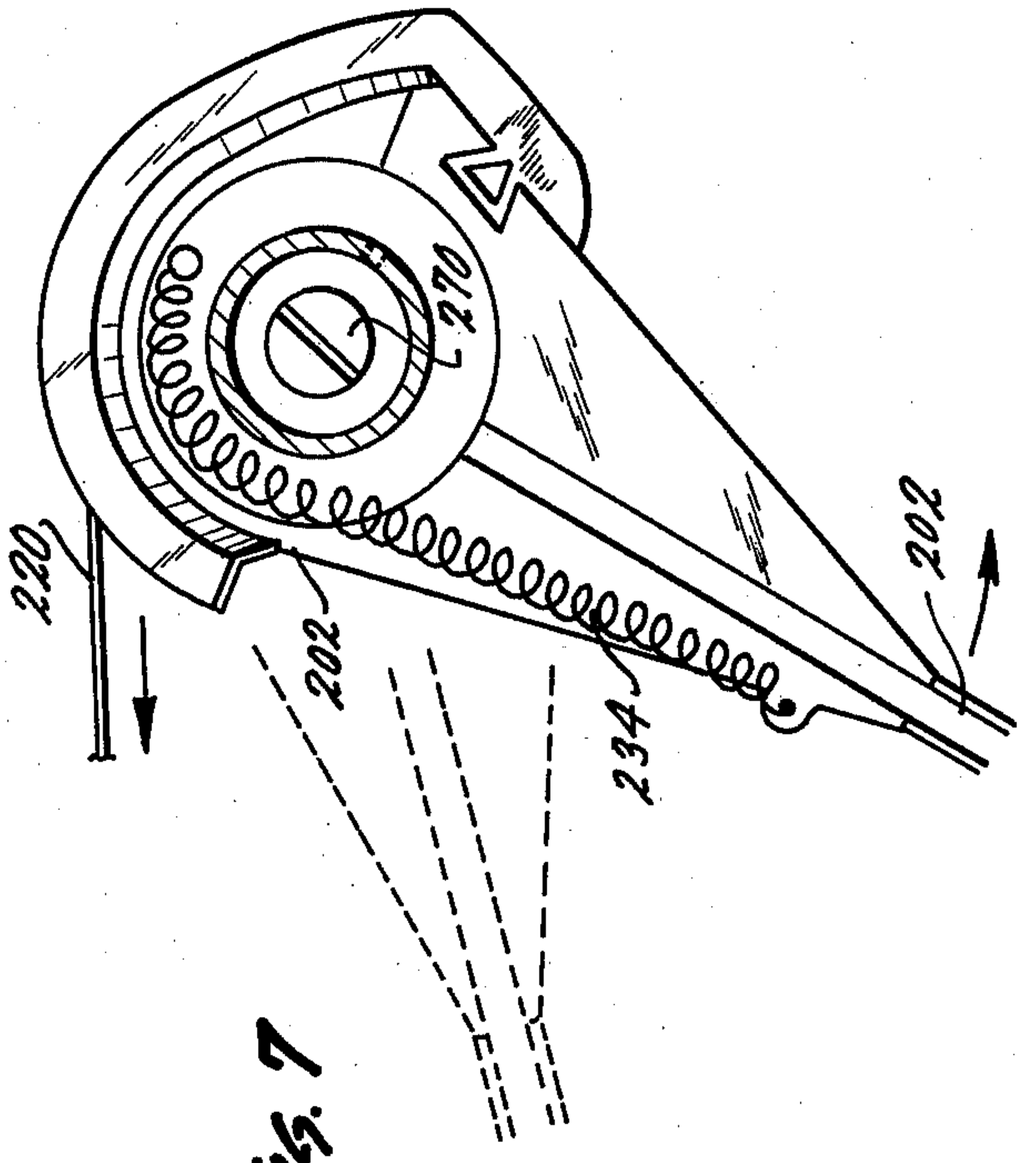


FIG. 7

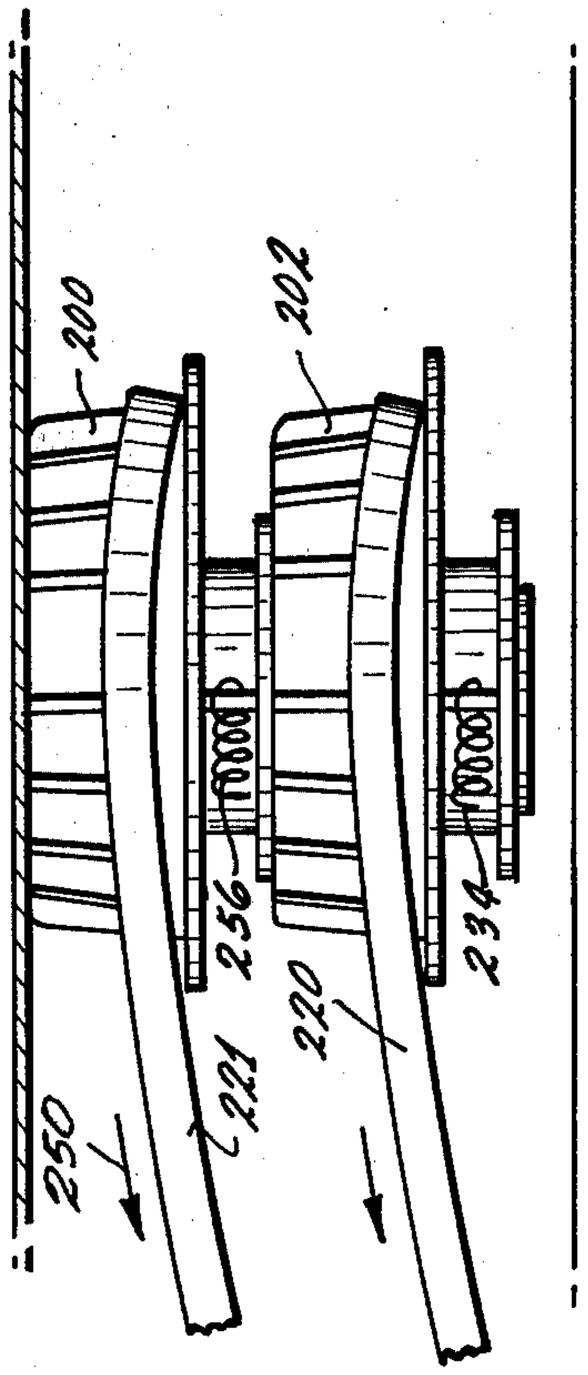


FIG. 9

VEHICLE RACING GAME APPARATUS

BACKGROUND OF THE INVENTION

The background of the invention will be set forth in two parts.

1. Field of the Invention

The present invention pertains generally to the field of vehicle racing games and more particularly to an improved propulsion system for propelling toy vehicles around a continuous track forming a closed loop.

2. Description of the Prior Art

The prior art known to applicant consists of a co-pending patent application now abandoned entitled Vehicle Racing Game Apparatus, Ser. No. 609,479, Marius Joseph Morin and Otto Leonhard Gabler, inventors, assigned to the same assignee as is the present application, as well as the prior art referenced therein.

SUMMARY OF THE INVENTION

The propulsion arm is rotatably mounted about a vertical shaft which in the illustrated embodiment of the present invention is located at the center of a semi-circular portion of a simulated closed loop raceway. The arm is free to rock a vertical plane about a fulcrum located on a horizontal axis in the vicinity of the intersection of said vertical shaft and said horizontal surface. Said propulsion arm is also provided with a circumferential drum surface vertically displaced from said fulcrum.

Drive impulses originating from a rotatably mounted driving hub, also having a circumferential drum surface provided as part thereof, are transmitted to said propulsion arm by means of a drive tape having one end fastened to the circumferential drum associated with the driving hub and having its other end fastened to the circumferential drum surface associated with the propulsion arm.

In view of the fact that the propulsion arm drum surface is vertically displaced from said fulcrum, drive impulses transmitted by said tape will cause said arm not only to rotate about said shaft, but also to rock in a vertical plane into an operating position.

The end of the propulsion arm is provided with a vehicle engaging member which in the embodiment illustrated is normally located in a depression in the simulated raceway but which in response to the actuating impulses rises into the path of travel of a toy vehicle and makes contact with the rear thereof thereby transmitting said drive impulses to said vehicle and propelling same about said simulated raceway.

For a more complete understanding of the present invention, both respect to its construction and to its operation, reference is made to the appended drawings and the detailed description of the preferred embodiment which follows.

It should be noted that the embodiment illustrated is exemplary only and not meant to limit the scope of the present invention as defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a vehicle racing game apparatus incorporating an embodiment of the present invention;

FIG. **2** is an enlarged, partial plan view of the apparatus of FIG. **1** showing an embodiment of the improved propulsion device of the present invention located entirely within one of the curves shown in FIG. **1**;

FIG. **3** is a bottom view of the apparatus shown in FIG. **2**.

FIG. **4** is an enlarged perspective view of one of the propulsion arms of the propulsion device shown in FIGS. **2** and **3**;

FIG. **5** is an enlarged perspective view of one of the driving arms of the propulsion device shown in FIGS. **2** and **3**.

FIG. **6** is an enlarged, partial cross-sectional view of the propulsion arms mounted on their shaft taken along line **6—6** of FIG. **3**;

FIG. **7** is a plan and cross-sectional view of the lower arm mounted on its shaft looking upward from the plane defined by line **7—7** of FIG. **6**;

FIG. **8** is a plan and cross-sectional view of the upper arm mounted on its shaft looking upward from the plane defined by line **8—8** of FIG. **6**; and

FIG. **9** is an enlarged, partial cross-sectional view of the propulsion arm hubs taken along **9—9** of FIG. **3**, and then inverted.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring again to the drawings, and more particularly to FIG. **1**, a vehicle racing game apparatus constituting an embodiment of the present invention, generally designated **10**, may be positioned on the floor of a child-user's room or other suitable supporting surface generally designated **12**.

The vehicle racing game apparatus **10** may have a plurality of individual, side-by-side tracks upon which a plurality of toy vehicles may be run. The apparatus is shown herein for purposes of illustration, but not of limitation, as comprising two side-by-side tracks **14, 16** forming a closed loop **18** having a first curve **20** at one end and a second curve **22** at the other end. Tracks **14, 16** support toy vehicles **24, 26**, respectively, each of which moves around the closed loop **18** as a result of impulses applied to it by a vehicle-propulsion device **28** located entirely within curve **20** for manual operation by a child-user.

The tracks **14, 16** include first track sections **30, 32** each having an upstream end **34** connected to the downstream end **36** of curve **20** and a downstream end **38** connected to the upstream end **40** of curve **22.** Each track section **30, 32** includes a flat running surface **42** at each edge of which is an upstanding guide wall **44** adapted to guide vehicles **24, 26** along track sections **30, 32,** respectively. Track sections **30, 32** may be extruded from a soft, pliable plastic material and may be supported intermediate their ends by a suitable block **46** to elevate the midportion of track sections **30, 32** above surface **12** to eliminate unwanted dips in the track sections and to ensure that the track surface **42** is relatively level in the vicinity of the exit portion (downstream end **36**) of propulsion device **28** contained in curve **20.** Tracks **14, 16** also include track sections **48, 50** each having a downstream end **52** connected to the upstream end **54** of curve **20** and an upstream end **56** connected to the downstream end **58** of curve **22.** The track sections **48, 50** each also have a flat running surface **60** and upstanding guide walls **62.**

Curve **22** includes a first banked section **64** forming part of track **14** and a second banked section **66** forming part of track **16.** A simulated crash-barrier **68** may be provided on the end of curve **20** and may be made from cardboard, plastic or the like. Barrier **68** may be decorated with simulated flags **70,** if desired. Addition-

ally, a simulated observers stand **72** may be placed upon surface **12** adjacent curve **22.**

Referring now to FIGS. **1** and **2,** curve **20** includes a housing **74** having a top wall **76,** an encompassing, depending side wall **78** and an open bottom **80.** Top wall **76** forms a running surface for cars **24, 26** and is divided into lanes **82, 84** by upstanding guide walls **86, 88** and **90.** Ends **36** of track sections **30, 32** are connected to housing **74** by connecting tabs **92, 94,** respectively, and ends **52** of track sections **48, 50** are connected to housing **74** by tabs **96, 98,** respectively.

Propulsion device **28** includes a first vehicle-engaging member **100** protruding from a generally horizontal, arcuate slot **102** provided in side wall **88** between lanes **82** and **84** and having an enlarged upstream end **104,** said slot extending generally horizontally along said lane **82** to a downstream slot end **106.** Vehicle-engaging member **100** is normally maintained at end **104** of slot **102** in a depression **105** in lane **82** by a structure to be hereinafter described. This structure is connected to an operating lever **108** which is swingably mounted on housing **74** by a pin **110,** operating lever **108** provides the actuating force for moving member **100** from its normal position at end **104** upwards and into the path-of-travel of vehicle **24** as lever **108** is swung in the direction of arrow **112,** as is illustrated in FIG. **1.**

Propulsion device **28** also includes a second vehicle-engaging member **114** (not visible in FIG. **1**) substantially identical to first member **100** and protruding from a second arcuate slot **116** having an upstream end **118** extending through an opening **120** in guide wall **90** adjacent upstream end **40** of curve **22,** and is normally maintained in a depression **121** provided in top surface of lane **84** in the vicinity of slot upstream end **118.** Member **114** may be moved from the position shown in FIG. **2** to a position for engagement with vehicle **26** by swinging a lever **122** in the direction of arrow **124.** Lever **122** is swingably mounted on housing **74** by a pin **126.**

Also shown in FIGS. **1** and **2** is a transparent housing **128** which may make provision for vehicle braking means and which gives additional structural rigidity to housing **74.**

Referring now generally to FIGS. **3–9,** it may be seen that there are provided two propulsion arms, an upper arm **200** associated with inner track surface **84** and inner slot **116** to which the second vehicle engaging member **114** (not visible in FIG. **3**) is appended and a lower propulsion arm **202** associated with outer track **82** and outer slot **102** to which the first vehicle propulsion member **100** is appended. Arm **202** (see FIG. **4**) comprises in addition to vehicle engaging member **100,** an inner hub portion **204** having an upper surface **206** which together with the adjacent horizontal surface of housing **74** defines a fulcrum at points **208A** and **208B,** said points defining an axis **210** generally perpendicular to the extended portion of arm **212.** Arm **202** also comprises an outer hub portion **214** having a flange **216** and a vertical circumferential drum surface **218.** A drive tape **220** is wrapped about said drum surface and may be fastened to an appropriately shaped aperture **222** in the outer hub by means of a tape fastener **224,** which may be of the type disclosed in a separate application entitled "Tape and Fastening System", Ser. No. 665,022, filed Feb. 3, 1976, Robert Ford Dyer and Nicholas De Anda, inventors, assigned to the same assignee as is the present invention. It should be noted in particular that circumferential drum surface **218** is offset from axis **210** through said fulcrum points **208***a* and **208***b* so that when tension is applied to tape **220** in the direction indicated by the arrow **226,** torque is exerted about axis **210** in the direction shown by the arrow **228** resulting in an upwards movement of vehicle engaging member **100** as indicated by arrow **230,** in addition to the rotation of the arm as indicated by arrow **232.** A return spring **234** is also provided.

Attached to the other end of tape **220** by another suitable tape fastener **224'** is a driving hub **240** which carries the handle **108** mentioned previously with respect to FIGS. **1** and **2.** Hub **240** also has a circumferential drum surface **242** but said surface unlike surface **218** is horizontal, the transition from horizontal to vertical being accommodated by flexible tape **220** as is clearly shown in FIG. **3,** which figure also showing a post **244** about which said tape passes on its way from arm **202** to driving hub **240.**

The aforesaid upwards motion of arm **200** may be seen more clearly in FIG. **6.** The force exerted on tape **221** in the direction indicated by the arrow **250** produces a tilting motion about the fulcrum at point **252,** thereby causing arm **200** to assume the position indicated by the dashed line at **254** against the counter-force produced by coil spring **256** (which is also offset from the axis defined by fulcrum point **252**). It should be noted that there is a sloppy fit between the inner hub portion of arm **200** and the shaft **258** about which it rotates, resulting in the space there between indicated by **260.** Still referring to FIG. **6,** it may be seen that lower arm **202** also has its hub **264** mounted about shaft **258,** surface **266** being provided for the action of the fulcrum points **208***a* and **208***b*. Lower arm **202** is similarly mounted about said shaft with a sloppy fit such that it is also capable of moving upwards upon the application of tension to tape **220.** Both upper and lower hubs are held in place on shaft **258,** as are upper spring retainer **266** and lower spring retainer **268,** by means of fastening screw **270.**

While the particular vehicle-racing game apparatus herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims which form a part of this disclosure.

Whenever the term "means" is employed in these claims, this term is to be interpreted as defining the corresponding structure illustrated and described in the specification or the equivalent of the same.

What is claimed is:

1. An improved toy vehicle propulsion system for providing propulsion impulses by means of an external vehicle engaging member to a toy vehicle, said system comprising:

a rotatably mounted driving hub;

a handle attached to said driving hub for imparting rotational impulses to said driving hub;

a circumferential drum surface provided as part of said driving hub and co-axial therewith;

a drive tape having one end thereof attached to and a portion generally disposed about said drum surface;

a vertical shaft extending from a generally horizontal surface; and

a propulsion arm rotatably mounted about said vertical shaft, said arm comprising:

an inner hub portion which together with said horizontal surface defines a fulcrum immediately adjacent the intersection of said vertical shaft and said horizontal surface, said arm being free to rock in a vertical plane about said fulcrum;

an outer hub portion defining a generally vertical circumferential drum surface vertically displaced from said fulcrum, the other end of said drive tape being fastened to said outer hub portion and a portion of said tape being generally disposed about said vertical drum surface; and

a vehicle engaging member provided at the end of said arm remote from said inner and outer hub portions, whereby an actuating impulse applied to said handle by a child-user is translated into a vertical and arcuate motion of said vehicle engaging member into and along the path of travel of a toy vehicle to be propelled.

2. The system of claim **1** wherein said outer hub portion vertical circumferential drum surface is provided with a lower flange for retaining said drive tape.

3. The propulsion system of claim **1** supplemented by a second such system associated with a second toy vehicle, the vertical shaft of said propulsion system being co-axial with the vertical shaft of said second such system.

4. The supplemented system of claim **3** wherein the drive tape of said second such system has its direction reversed by means of a vertical post.

5. The system of claim **1** further comprising a spring means for causing said vehicle engaging member to be normally positioned out of the path of travel of said toy vehicle.

6. The system of claim **5** wherein said spring means comprises a coil spring attachedly disposed between said arm and said shaft vertically remote from said fulcrum.

* * * * *